CLAIMS

1. A central radio pool/traffic router comprising:

a plurality of low-power radios that are effective in receiving voice signals and using the voice signals to produce modulated radio channel signals, the plurality of low-power radios further being effective in receiving a plurality of individual radio channels and converting each of the plurality of individual radio channels into a plurality of voice signals and transmitting each of the plurality of voice signals;

means for switching coupled to the plurality of low-power radios and effective in receiving the plurality of voice signals from the plurality of low-power radios and effective in receiving a plurality of individual radio channels and transmitting each of the plurality of individual radio channels to the plurality of low-power radios;

means for optically modulating effective in modulating an optical carrier using an RF signal to produce a modulated optical carrier and transmitting the modulated optical carrier;

means for optically demodulating effective in receiving a plurality of individual optical channels and demodulating the plurality of individual optical channels to produce associated radio channel frequencies and transmitting the associated radio channel frequencies;

means for combining effective in receiving the modulated optical signals and combining the modulated optical signals with additional modulated optical signals to produce a composite signal; and

means for splitting effective in separating associated radio channel frequencies to form a plurality of individual radio channels.

2. A central radio pool/traffic router in accordance with claim 1, wherein the plurality of low-power radios are effective in being assigned to channel frequencies according to channels allotted to the destined cell.

3. A central radio pool/traffic router in accordance with claim 1, wherein each of the plurality of low-power radios is tuned to a different frequency.

4. A central radio pool/traffic router in accordance with claim 1, wherein each of the plurality of low-power radios can serve each of a plurality of base stations.

5. A central radio pool/traffic router in accordance with claim 1, wherein the plurality of low-power radios comprise a plurality of low-power digital radios.

6. A central radio pool/traffic router in accordance with claim 1, wherein the plurality of low-power radios comprise a plurality of low-power analog radios.

7. A central radio pool/traffic router in accordance with claim 1, wherein the composite RF signal comprises digital signals and analog signals.

8. A central radio pool/traffic router in accordance with claim 1, wherein the plurality of low-power radios utilize the same radio frequencies that will subsequently be utilized in the destination cells.

9. A central radio pool/traffic router in accordance with claim 1, wherein the plurality of low-power radios utilize frequencies that are upbanded or downbanded from the corresponding frequencies used in the destination cell.

10. A central radio pool/traffic router in accordance with claim 1, wherein the means for switching comprises an RF interconnect switch.

11. A central radio pool/traffic router in accordance with claim 1, wherein the means for switching comprises an optical switching matrix.

12. A central radio pool/traffic router in accordance with claim 1, wherein the means for optically modulating comprises an optical modulator.

13. A central radio pool/traffic router in accordance with claim 12, wherein each of the plurality of low-power radios are coupled to a dedicated one of the plurality of optical modulators.

14. A central radio pool/traffic router in accordance with claim 1, wherein the means for optically demodulating comprises an optical demodulator.

15. A central radio pool/traffic router in accordance with claim 1, wherein the means for combining comprises an RF combiner.

16. A central radio pool/traffic router in accordance with claim 1, wherein the means for combining comprises an optical multiplexer.

17. A central radio pool/traffic router in accordance with claim 16, wherein the plurality of optical multiplexers utilize dense wave division multiplexing (DWDM)to combine the optical signals.

18. A central radio pool/traffic router in accordance with claim 16, wherein each of the plurality of optical multiplexers is dedicated to a base station.

19. A central radio pool/traffic router in accordance with claim 1, wherein the means for splitting comprises an RF splitter.

20. A central radio pool/traffic router in accordance with claim 1, wherein the means for splitting comprises an optical demultiplexer.

21. A central radio pool/traffic router in accordance with claim 1, wherein the RF signal used to produce a modulated optical carrier comprises a composite RF signal comprising a plurality of individual RF channels.

22. A communication system for providing sharing of radio resources by a plurality of base stations, the communication system comprising:

a plurality of base stations that transmit and receive radio signals to and from cell phones operating in cells;

a mobile switching center (MSC) coupled to the plurality of base stations, the MSC comprising:

a central radio pool/traffic router comprising:

a plurality of low-power radios that are effective in receiving voice signals and using the voice signals to produce modulated radio channel signals, the plurality of low-power radios further being effective in receiving a plurality of individual radio channels and converting each of the plurality of individual radio channels into a plurality of voice signals and transmitting each of the plurality of voice signals;

means for switching coupled to the plurality of low-power radios and effective in receiving the plurality of voice signals from the plurality of low-power radios and effective in receiving a plurality of individual radio channels and transmitting each of the plurality of individual radio channels to the plurality of low-power radios;

means for optically modulating effective in modulating an optical carrier using an RF signal to produce a modulated optical carrier and transmitting the modulated optical carrier;

means for optically demodulating effective in receiving a plurality of individual optical channels and demodulating the plurality of individual optical channels to produce associated radio channel frequencies and transmitting the associated radio channel frequencies;

means for combining effective in receiving the modulated optical signals and combining the modulated optical signals with additional modulated optical signals to produce a composite signal; and

means for splitting effective in separating associated radio channel frequencies to form a plurality of individual radio channels;

a switch for switching voice and or data signals between the CRP/TR and one or more external networks; and

a control complex that includes a processor.

23. A method for transmitting a message from a first phone to a cell phone utilizing a central radio pool/traffic router, the method comprising the steps of:

receiving a voice signal from the first phone at a switch, the voice signal intended for the cell phone;

passing the voice signal from the switch to a radio;

modulating the voice signal at the radio onto a radio channel to produce a modulated voice signal;

feeding the modulated voice signal to an RF interconnect switch;

passing the modulated voice signal from the RF interconnect switch to an RF combiner/splitter;

combining by the RF combiner/splitter the radio channel with other radio channels used by other calls to form a composite RF signal;

passing the composite RF signal to an optical modulator/demodulator;

modulating an optical carrier by the optical modulator/demodulator using the composite RF signal, thereby translating the composite frequencies to optical frequencies;

sending the modulated optical carrier to a base station over an optical fiber link;

demodulating the optical carrier to produce a composite RF signal; and

transmitting the composite RF signal from the base station to the cell phone.

24. A method for transmitting a message in accordance with claim 23, the method further comprising the step of, prior to passing the voice signal from the switch to the radio, selecting the radio by a program running in a processor.

25. A method for transmitting a message in accordance with claim 24, wherein the processor can select any of a plurality of available radios.

26. A method for transmitting a message in accordance with claim 24, wherein the selection is independent of the terminating cell carrying the call.

27. A method for transmitting a message in accordance with claim 24, wherein the processor can instruct any of a plurality of radios to tune to any of a plurality of available radio channels.

28. A method for transmitting a message in accordance with claim 23, wherein the resulting composite RF signal comprises both digital and analog traffic.

29. A method for transmitting a message in accordance with claim 23, wherein radio channel spacing is preserved when the composite RF signal is modulated onto the optical carrier.

30. A method for transmitting a message from a first phone to a cell phone utilizing a central radio pool/traffic router (CRP/TR) including a plurality of low-power radios, the method comprising the steps of:

receiving a call intended for the cell phone from the first phone at a switch;

sending a page over a control channel from one of the plurality of low-power radios to a plurality of base stations, each of which transmits the page within its cell;

receiving indication from one of the plurality of base stations that the intended cell phone is in the geographic area served by the one of the plurality of base stations;

assigning one of the plurality of low-power radios in the CRP/TR to the call; and

routing signals between the assigned low-power radio and the one of the plurality of base stations serving the area in which the cell phone is operational.

31. A central radio pool/traffic router comprising:

a plurality of low-power radios that are effective in receiving voice signals from a first telephone, each of the plurality of low-power radios effective in modulating a radio carrier to produce a modulated radio signal;

an RF interconnect switch coupled to the plurality of low-power radios, the RF interconnect switch being effective in receiving the modulated radio signals from the plurality of low-power radios;

a plurality of RF combiners coupled to the RF interconnect switch and effective in receiving and combining the modulated radio signals to produce a composite RF signal; and

a plurality of optical modulators coupled to the plurality of RF combiners and effective in receiving the composite RF signals from the plurality of RF combiners, the plurality of optical modulators being further effective in modulating an optical carrier using the composite RF signal to produce a modulated optical carrier and transmitting the modulated optical carrier.

32. A central radio pool/traffic router in accordance with claim 31, wherein the plurality of low-power radios are effective in being assigned to channel frequencies according to channels allotted to the destined cell.

33. A central radio pool/traffic router in accordance with claim 31, wherein each of the plurality of low-power radios is tuned to a different frequency.

34. A central radio pool/traffic router in accordance with claim 31, wherein each of the plurality of low-power radios can serve each of a plurality of base stations.

35. A central radio pool/traffic router in accordance with claim 31, wherein the plurality of low-power radios comprise a plurality of low-power digital radios.

36. A central radio pool/traffic router in accordance with claim 31, wherein the plurality of low-power radios comprise a plurality of low-power analog radios.

37. A central radio pool/traffic router in accordance with claim 31, wherein the composite RF signal comprises digital signals and analog signals.

38. A central radio pool/traffic router comprising:

a plurality of optical demodulators, each of the plurality of optical demodulators being effective in receiving an optical signal that is modulated with a composite RF signal comprising one or more RF channels, and which is effective in demodulating the optical signal to produce the composite RF signal, and which is effective in transmitting the composite RF signal;

a plurality of RF splitters coupled to the plurality of optical demodulators and effective in receiving the composite RF signals and in separating individual radio channels from the composite RF signals to form a plurality of individual radio channels;

an RF interconnect switch coupled to the plurality of RF splitters, the RF interconnect switch being effective in receiving the plurality of individual radio channels and transmitting each of the plurality of individual radio channels; and

a plurality of low-power radios coupled to the RF interconnect switch and effective in receiving the plurality of individual radio channels and converting each of the plurality of individual radio channels into a plurality of voice signals and transmitting each of the plurality of voice signals.

39. A central radio pool/traffic router in accordance with claim 38, wherein the plurality of low-power radios are effective in being assigned to channel frequencies according to channels allotted to the destined cell.

40. A central radio pool/traffic router in accordance with claim 38, wherein each of the plurality of low-power radios is tuned to a different frequency.

41. A central radio pool/traffic router in accordance with claim 38, wherein each of the plurality of low-power radios can serve each of a plurality of base stations.

42. A central radio pool/traffic router in accordance with claim 38, wherein the plurality of low-power radios comprise a plurality of low-power digital radios.

43. A central radio pool/traffic router in accordance with claim 38, wherein the plurality of low-power radios comprise a plurality of low-power analog radios.

44. A central radio pool/traffic router comprising:

a plurality of low-power radios that receive voice signals and output RF signals;

a plurality of optical modulators coupled to the plurality of low-power radios and effective in receiving the RF signals and translating the RF signals to optical signals by modulating an optical carrier using the RF signals and transmitting the optical signals;

an optical switching matrix coupled to the plurality of optical modulators and effective in receiving the optical signals and transmitting the optical signals; and

a plurality of optical multiplexers coupled to the optical switching matrix and effective in combining the optical signals with additional optical signals to produce composite optical signals, the plurality of optical multiplexers being effective in transmitting the composite optical signals.

45. A central radio pool in accordance with claim 44, wherein the plurality of low-power radios utilize the same radio frequencies that will be utilized in the destination cell.

46. A central radio pool in accordance with claim 44, wherein the plurality of low-power radios utilize radio frequencies that are upbanded or downbanded from the corresponding frequencies used in the destination cell.

47. A central radio pool in accordance with claim 44, wherein each of the plurality of low-power radios are coupled to a dedicated one of the plurality of optical modulators.

48. A central radio pool in accordance with claim 44, wherein the plurality of optical multiplexers utilize dense wave division multiplexing (DWDM)to combine the optical signals.

49. A central radio pool in accordance with claim 44, wherein each of the plurality of optical multiplexers is dedicated to a base station.

50. A central radio pool/traffic router comprising:

a plurality of optical demultiplexers, each of the plurality of optical demultiplexers being effective in receiving a composite optical signal and separating a plurality of individual optical channels from the composite optical signal and transmitting the plurality of individual optical channels;

an optical switching matrix coupled to the plurality of optical demultiplexers that is effective in receiving the plurality of individual optical channels and in transmitting each of the plurality of individual optical channels to a designated path;

a plurality of optical demodulators coupled to the optical switching matrix and effective in receiving the plurality of individual optical channels and demodulating the plurality of individual optical channels to obtain associated radio channel frequencies and transmitting the associated radio channel frequencies; and

a plurality of low-power radios coupled to the plurality of optical demodulators and effective in receiving the radio channel frequencies and converting the radio channel frequencies into a voice signal and transmitting the voice signal.

51. A central radio pool in accordance with claim 50, wherein the plurality of low-power radios utilize the same radio frequencies that will subsequently be utilized in the destination cell.

52. A central radio pool in accordance with claim 50, wherein each of the plurality of low-power radios are coupled to a dedicated one of the plurality of optical modulator/demodulators.

53. A central radio pool in accordance with claim 50, wherein each of the plurality of optical demultiplexers is dedicated to a base station,

54. A base station for use with a central radio pool/traffic router, the base station comprising:

an optical demodulator that extracts an RF signal from an optical carrier;

an RF amplifier that receives the extracted RF signal and amplifies the RF signal to produce an amplified signal; and

a transmit antenna that receives the amplified signal from the amplifier and radiates the amplified signal into a cell associated with the transmit antenna for reception by cell phones operating within the cell.

55. A base station in accordance with claim 54, wherein the RF amplifier amplifies a composite RF signal that spans multiple radio frequency channels.

56. A base station for use with a central radio pool/traffic router, the base station comprising:

a plurality of diversity receive antennas that receive multipath signals from a plurality of cell phones;

an RF receiver that diversity-processes the multipath signals to produce a diversity-processed signal; and

an optical modulator that receives the diversity-processed signal and modulates an optical carrier using the diversity-processed signal.

57. A base station in accordance with claim 56, wherein the plurality of diversity receive antennas receive multipath signals that span multiple radio frequency channels.

58. A base station for use with a central radio pool/traffic router, the base station comprising:

an optical demultiplexer that separates individual optical channels from a composite optical signal received from the central radio pool/traffic router and transmits the individual optical channels;

an optical demodulator that receives the individual optical channels and reverts each individual optical channel to an associated radio channel;

an RF amplifier that receives the radio channels, amplifies the radio channels to produce amplified radio channels, and transmits the amplified radio channels; and

an antenna that receives the amplified radio channels and radiates the amplified radio channels within a cell associated with the base station.

59. A base station in accordance with claim 58, wherein the optical demodulator restores the correct channel spacing of each individual optical channel.

60. A base station for use with a central radio pool/traffic router, the base station comprising:

a plurality of diversity receive antennas that receive a plurality of signals from a mobile unit;

a wideband RF receiver coupled to the plurality of diversity receive antennas that processes the plurality of signals to produce a plurality of robust signals;

an optical modulator that receives the plurality of robust signals and uses the plurality of robust signals to modulate a plurality of optical carriers to produce a plurality of individual optical channels; and

an optical multiplexer that combines the plurality of individual optical channels to produce a composite optical signal.

61. A mobile switching center comprising:

a central radio pool/traffic router (CRP/TR) comprising:

a plurality of low-power radios that are effective in receiving voice signals and using the voice signals to produce modulated radio channel signals, the plurality of low-power radios further being effective in receiving a plurality of individual radio channels and converting each of the plurality of individual radio channels into a plurality of voice signals and transmitting each of the plurality of voice signals;

means for switching coupled to the plurality of low-power radios and effective in receiving the plurality of voice signals from the plurality of low-power radios and effective in receiving a plurality of individual radio channels and transmitting each of the plurality of individual radio channels to the plurality of low-power radios;

means for optically modulating effective in modulating an optical carrier using an RF signal to produce a modulated optical carrier and transmitting the modulated optical carrier;

means for optically demodulating effective in receiving a plurality of individual optical channels and demodulating the plurality of individual optical channels to produce associated radio channel frequencies and transmitting the associated radio channel frequencies;

means for combining effective in receiving the modulated optical signals and combining the modulated

optical signals with additional modulated optical signals to produce a composite signal; and

means for splitting effective in separating associated radio channel frequencies to form a plurality of individual radio channels;

a switch; and

a controller that selects the frequency in which each of the plurality of low-power radios operate.